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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,883	04/11/2005	Yoshitaka Sugawara	3688KE-1	9237

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EXAMINER	
SEFER, AHMED N	

ART UNIT	PAPER NUMBER
2826	

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10/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/530,883	SUGAWARA, YOSHITAKA	
	Examiner	Art Unit	
	A. Sefer	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5,7,8,10,11 and 18-30* is/are pending in the application.

4a) Of the above claim(s) *23-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5,7,8,10,11,18-22 and 26-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/27/07 & 9/26/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/27/2007 has been entered.

Election/Restrictions

2. Newly submitted claims 23-25 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: a materially different process that does no include the step of operating the wide-gap bipolar semiconductor element with applied current smaller than a rated current could make the device of claim 1.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 23-25 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

> pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1, 5, 8, 10, 11, 18-22 and 26-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The application as originally filed does not specifically support the claim limitation "means for heating said wide-gap bipolar semiconductor element inside said semiconductor package at a temperature of 50 °C or more." There is no discussion in the specification about the inside said semiconductor package being at a temperature of 50 °C.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The following is a quotation of 35 U.S.C. § 112, sixth paragraph, which forms the basis for determining interpreting certain forms of functional language in claims:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. 35 USC 112 paragraph 6.

7. According to MPEP 2181, limitations in amended claim 1 and newly submitted claim 18 will be presumed to invoke 35 U.S.C. 112, sixth paragraph, if the following 3-prong analysis are met:

(A) the claim limitations must use the phrase "means for " or "step for; "

(B) the "means for " or "step for " must be modified by functional language; and

(C) the phrase "means for " or "step for " must not be modified by sufficient structure, material, or acts for achieving the specified function.

With respect to part A, the claim limitations in claims 1 and 18 use the phrase "means for."

With respect to part B, the claim limitations in claims 1 and 18 are modified by functional language calling for, "heating said wide-gap bipolar semiconductor element in side said semiconductor package at a temperature of 50 °C or more.

With respect to part C, the claim limitations in claims 1 and 18 are not be modified by sufficient structure.

Therefore, claims 1, 18, and all other claims that depend from claim 1are presumed to invoke 35 U.S.C. 112, sixth paragraph and the claim limitations shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. In the instant case, the limitation, "means for heating" will be construed to cover a heater having a nichrome wire and a heat sink (see pp. 27 and 51, lines 7-11 and 13-15 respectively).

8. Claims 1, 8, 11 and 19-21 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara JP-2002-325355 ("Sugawara '55") **(of record)** in view of Sugawara, "Recent Progress in Sic Power Device Developments and Application Studies," April 14-17. 2003, Cambridge, UK. pp. 10-18 ("Sugawara '03).

Sugawara '55 discloses in figs. 1-4 a semiconductor device comprising: a wide-gap bipolar semiconductor element 24/26 using a wide-gap semiconductor and having a built-in voltage in the forward direction, a semiconductor package 1010 accommodating said wide-gap bipolar semiconductor element and having electrical connection means (106, 1289A, 1289B, 128) for connecting said wide-gap bipolar semiconductor element to external apparatuses, but does not specifically disclose heating means.

Sugawara '03 discloses (pp. 12 and 15, numeral III and V, B respectively) a semiconductor device comprising: a wide-gap bipolar semiconductor element and a compact heat sink.

Therefore, in view of Sugawara '03's teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Sugawara '55 by incorporating a heat sink. The motivation for doing so would have been to reduce the built-in potential and lower total power loss as taught by Sugawara (page 15, left col., first par.). Therefore, it would have been obvious to combine Sugawara '55 and Sugawara '03 to yield the device structure as recited in claim 1.

Re claim 8, Sugawara '03 discloses (pp. 12 and 15, numeral III and V, B respectively) a heat sink that raises the temperature of said wide-gap bipolar semiconductor element. Sugawara '03' teaches a compact heat sink which is understandably capable of receiving and dissipating heat; thus the limitation, "by controlling a radiation of heat generated when said wide-gap bipolar semiconductor element is energized" is met.

RE claim 11, Sugawara '55 discloses (see paragraph [41] of machine translated document) the wide-gap bipolar semiconductor element 24/26 being a gate drive type SiC-GTO

thryistor. Thus, the limitation, "the wide-gap semiconductor being a self-excited thyristor" is met.

Re claim 19, Sugawara '55 discloses a support made of metal 9, on which the wide-gap bipolar semiconductor element is mounted.

Re claim 20, Sugawara '55 discloses a cap 4 made of metal fixed on the support so as to cover the wide-gap bipolar semiconductor element.

Re claim 21, Sugawara '55 discloses semiconductor element 24/26 being mounted via insulation plate 129 on the support. Regarding the means for heating being located on the lower face of the support, it is conventional to locate means for heating on a lower face of the support.

Re claims 26-29, the recited limitations do not further limit the device structure, but only limit its method of heating.

9. Claims 1, 5, 7, 10, 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Sugawara '55" in view of Tato ("Tato") JP 9-148681.

Sugawara '55 discloses in figs. 1-4 a semiconductor device comprising: a wide-gap bipolar semiconductor element 24/26 using a wide-gap semiconductor and having a built-in voltage in the forward direction, a semiconductor package 1010 accommodating said wide-gap bipolar semiconductor element and having electrical connection means (106, 1289A, 1289B, 128) for connecting said wide-gap bipolar semiconductor element to external apparatuses, but does not specifically disclose heating means.

Tato discloses in figs. 1 and 2 a semiconductor device comprising: a wide-gap semiconductor element and a heater.

Therefore, in view of Tato's teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Sugawara '55 by incorporating a heater. The motivation for doing so would have been to raise the temperature of the device as taught by Tato. Therefore, it would have been obvious to combine Sugawara '55 and Tato to yield the device structure as recited in claim 1.

Re claim 5, Tato discloses said heating means heats the semiconductor element. Tato also discloses (see abstract) that the heater is not used at the time of high temperature operation of the semiconductor element; thus, the recitation calling for, "in advance before the start of the operation of said wide-gap bipolar semiconductor element" is met.

Re claim 7, Tato discloses (see paragraph [0006] of machine translated document) the heater includes a NiCr (similar to applicants discloses heater including nichrome); thus, the recitation calling for, "said heating means is an electric heater providing heat to said wid-gap bipolar semiconductor element" is met.

Re claim 10, Tato discloses (see abstract) a temperature sensor 10 to monitor the temperature of the semiconductor element and a temperature control circuit (not shown); thus, the recitation calling for, "wherein said semiconductor package has a temperature sensor for detecting the temperature of said wide-gap bipolar semiconductor element and a temperature controller that keeps the temperature of said wide-gap bipolar semiconductor element at a temperature of 50 °C or more on the basis of a detection output of said temperature sensor" is met.

Re claim 19, Sugawara '55 discloses a support made of metal 9, on which the wide-gap bipolar semiconductor element is mounted.

10. Claims 21 and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara '55 in view of Tato as applied to claims 1 and 19 above, and further in view of Nakajima et al. ("Nakajima") US PG-Pub 2003/0213979.

The combined references disclose the device structure as recited in the claim including a bipolar element being bonded to a upper face of as support 103, but do not specifically disclose means for heating being located on the lower face of the support.

Nakajima discloses a bipolar element 1 being bonded to an upper face of as support 15, and a means for heating 16 being located on a lower face of the support.

Therefore, in view of Nakajima's teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to incorporate a heating means located on the lower face of the support so as to provide a proper means for heating.

Re claim 30, Nakajima discloses a package comprising a molded heat-resistant 14 encapsulating the bipolar element.

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over "Sugawara '55" in view of Tato.

Sugawara '55 discloses in figs. 1-4 a semiconductor device comprising: a wide-gap bipolar semiconductor element 24/26 using a wide-gap semiconductor and having a built-in voltage in the forward direction, a semiconductor package 1010 accommodating said wide-gap bipolar semiconductor element and having electrical connection means (106, 1289A, 1289B, 128) for connecting said wide-gap bipolar semiconductor element to external apparatuses, but discloses neither heating means nor temperature sensor nor controller.

Tato discloses (figs. 1 and 2 and abstract) a semiconductor device comprising: a wide-gap semiconductor element and a heater (heating means); a temperature sensor 10; and a temperature control circuit (not shown).

Therefore, in view of Tato's teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Sugawara '55 by incorporating a heater, a temperature sensor; and a temperature controller. The motivation for doing so would have been to raise, monitor and adjust the temperature of the device, as taught by Tato. Therefore, it would have been obvious to combine Sugawara '55 and Tato to yield the device structure as recited in claim 18.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (571) 272-1921.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ANS
September 30, 2007

A Sefer
Patent Examiner
Art Unit 2826